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Installation, Operating, & Maintenance Instructions

8494 Sidewinder™ RF

Monitor

98429000 REV. C

SYSTEM INFORMATION:

MONITOR SERIAL NUMBER: _____

MONITOR ACCESSORIES (NOZZLE GALLONAGE AND TYPE, TYPES OF TRANSMITTERS, WATER VALVE (Y/N), ETC.):

_____
_____
_____
_____
_____
_____
_____
_____

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I. PRODUCT SAFETY

Important:

Before installing and operating this equipment, read & study this manual thoroughly. Proper installation is essential to safe operation. In addition, the following points should be adhered to in order to ensure the safety of equipment and personnel:

1. All personnel who may be expected to use this equipment must be thoroughly trained in its safe and proper use.

2. Before flowing water from this device, check that all personnel (fire service and civilian) are out of the stream path. Also, check to make sure stream direction will not cause avoidable property damage.

3. Become thoroughly familiar with the hydraulic characteristics of this equipment, and the pumping system used to supply it. To produce effective fire streams, operating personnel must be properly trained.

4. Whenever possible, this equipment should be operated from a remote location. Do not needlessly expose personnel to dangerous fire conditions.

5. Open water valve supplying this equipment slowly, so that the piping fills slowly, thus preventing possible water hammer occurrence.

6. After each use, and on a scheduled basis, inspect equipment per instructions in section VI.

7. Any modifications to the electrical enclosures will destroy the NEMA 4 rating and void warranty coverage of the enclosure and all components within.

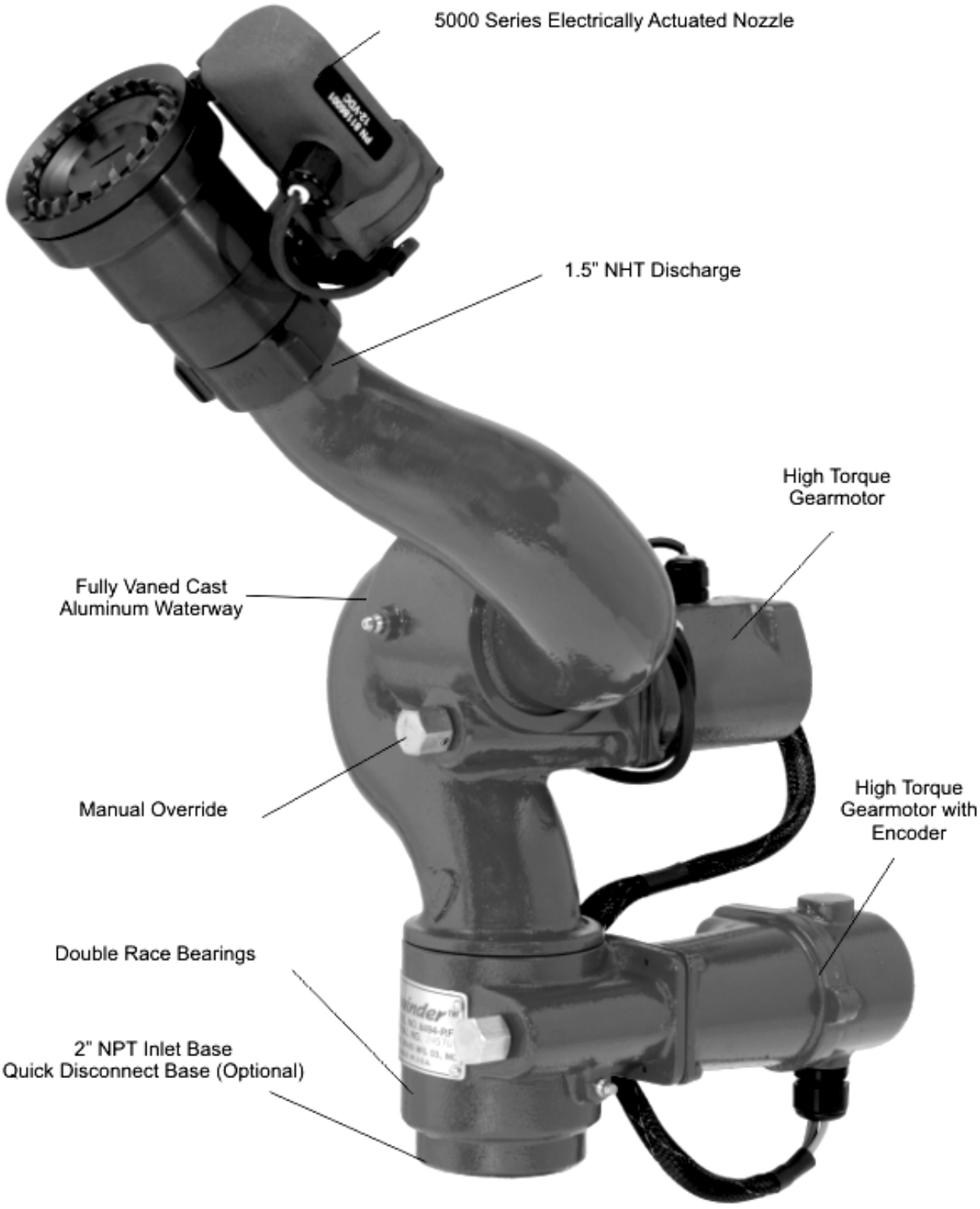


Figure 1

8494 *Sidewinder*™ RF Monitor

II. SYSTEM COMPONENT DESCRIPTIONS

A. *Sidewinder*™ RF Monitor

The *Sidewinder*™ RF Monitor is specially designed for use on off-road or wild land fire fighting apparatus. The *Sidewinder*™ RF is controlled from inside the cab through a wireless transmitter or by handheld transmitter so risk to firefighters is significantly reduced.

The *Sidewinder*™ RF features durable Elk-O-Lite® construction combined with rugged, stainless steel gears and motors that are completely enclosed and sealed for maximum protection from the elements. The *Sidewinder*™ RF has a flow efficient 2.0" vaned waterway to minimize turbulence and provide superior fire streams. Water supply is provided through the monitor base by 2" National Pipe Thread connection. The discharge nozzle connection is a 1½" National Hose Thread. Nozzle stream direction is controlled by two permanent magnet type gear motors, one controlling rotation about the axis of the water inlet, and the other controlling nozzle elevation and depression.

An optional 2.0" electric valve kit is available to allow the user to control water flow directly from the *Sidewinder*™ RF control box. This enables "pump and roll" functionality with complete control by the operator in the cab of the truck via wireless joystick control. The electric valve can also be controlled using the optional handheld wireless transmitter.

B. RF Receiver/Control Module

The monitor control circuit uses a state-of-the-art PIC (Programmable Integrated Circuit) chip design. This device allows numerous control features while keeping circuit board size to a minimum. Relays within this box provide motor reversing control for the Up/Down, Left/Right, valve Open/Close and nozzle Straight Stream/Fog functions.
All functions are sent to the RF receiver/control module via an encoded radio frequency link. The radio link reduces the number of control wires down to just the two power leads, dramatically simplifying the installation procedure. The link also allows wireless control from up to ¼ mile away using a battery powered handheld transmitter.

A rotary pulse counter, part of the horizontal motor, provides horizontal motion control feedback. The counter in combination with the PIC controller enables the monitor to move between programmable endpoints that are programmed by the user for rotation up to 360°total (+/- 180° from center). This feature also allows the unit to be programmed to oscillate between positions within the total travel setting. This feature can be programmed easily with any of the wireless transmitters. No mechanical stops to adjust.

The control circuit also provides secondary motor protection with the use of electronic current sensing circuitry. If the monitor encounters an obstruction before reaching a pre-set limit, this circuitry quickly senses motor stall current and automatically shuts off power to the motor. As soon as the control switch is released, the circuit resets to allow subsequent operation of the monitor.

Figure 2
81496001 RF Receiver/Control Module

Caution:
Any modification of the enclosure will destroy the NEMA 4 rating, and will void the warranty coverage of the RF Receiver/Control Module.

The following additional functions/features are provided in the RF receiver/control module:

Reverse Polarity Protection: If battery connections are reversed, this feature prevents power from being applied to circuits, and prevents damage to electronic components.

Circuit Board Moisture Protection: In addition to being protected within a NEMA 4 sealed enclosure, the circuit board and circuit components are protected from moisture by an acrylic resin conformal coating.

C. RF Transmitters

The 8494 RF monitor uses W.E.T. (Wireless Electronic Technology), an innovative wireless radio link, to send all commands from the RF transmitters to the RF Receiver/Control Module. The new W.E.T. wireless link gives the operator the ability to view the discharge stream and target from virtually any point of view. The 8494-RF monitor comes standard with a joystick or a twin joystick transmitter. An optional handheld transmitter can be purchased from Elkhart Brass and can be programmed to work with any W.E.T. enabled monitor.

1. Primary Transmitter

The Sidewinder RF has two joystick transmitter options. Either joystick transmitter can be used and will override the handheld transmitter.

81498001 Joystick Transmitter

(Figure 3) The RF joystick is suitable for mounting inside the apparatus cab. The joystick controls all four monitor functions plus oscillation. Up/Down and Left/Right monitor functions can be operated simultaneously. The water valve is controlled with a trigger switch on the front of the joystick. The water valve can also be locked open by activating the button located on the enclosure top. Nozzle pattern is changed using the rocker switch on the top of the joystick. The monitor direction is changed by moving the joystick in the desired direction. Oscillation is programmed by using the joystick in conjunction with the oscillate button.

Figure 3
81498001 Joystick Transmitter

Caution: Joysticks are not environmentally sealed. They are meant for in cab use only. Use outside of cab will void the warranty coverage.

2. Secondary Hand Held Transmitter

81502001 Handheld Transmitter

(Figure 4) A sealed handheld remote contains all the controls necessary for operation of the monitor, oscillation, nozzle, and water valve. The handheld remote allows the operator to direct the monitor from a significantly improved point of view. With the wireless remote, the operator can view the stream from the side and confirm it is hitting the target. Separate push button switches are provided for up, down, left, right, fog, stream, valve open, and valve close functions. The handheld remote has user selectable frequency and security codes that allow multiple monitors to operate on the same fire ground at the same time. The remote has an automatic power down feature that will shut down the power after 5 minutes of no activity. As an additional power saving feature, the radio signal is only transmitted while a button is pushed. The handheld remote case has a NEMA 4 rating.

Figure 4

81502001 Handheld Transmitter

Caution: Any modification of the enclosure of the handheld transmitter will destroy the NEMA 4 rating, and will void the warranty coverage of the remote control.

D. 5000 Series Nozzles

Three constant flow electric nozzles are offered with the *Sidewinder*™ RF monitor with flows ranging from 15 to 350 GPM. The nozzle pattern is electrically actuated and controlled by the monitor control box. The 5000-04 Series nozzles have a flush feature to clear debris from the nozzle without shutting down the water flow.

5000-04; 15, 30, or 45 GPM
5000-14; 60, 95, 125, or 150 GPM
5000-24; 175, 200, 250, or 350 GPM

Figure 5

5000-24 Electrically Actuated Nozzle

E. 81181501 Water Valve Kit (Optional)

The *Sidewinder*™ RF water valve kit provides a convenient remote on-off control of the water supply to the 8494 *Sidewinder*™ RF. This allows the operator complete control of the unit from the safety of the vehicle cab or radio handheld transmitter. The water valve motor speed prevents water hammer, yet closes quickly enough to help preserve the limited on-board water supply.

Figure 6
2920E Electrically Actuated Valve

F. SM-10FE De/Anti-Icing Nozzle

Designed for the aircraft deicing industry, this nozzle has been designed for use with type 1 de-icing, type 2 anti-icing, or type 4 anti-icing fluids. The SM-10FE has Viton® O-rings to withstand the use of the Ethylene Glycol and Propylene Glycol solutions used to de-ice aircraft. The nozzle is constant gallonage at pressures below 90 Psi and becomes automatic at 95 Psi. It is designed to deliver 20 GPM at 50 Psi and 30 –120 GPM from 90-110 Psi.

Figure 7
SM-10FE De/Anti-Icing Nozzle

III. CONTROL SYSTEM SPECIFICATIONS

Handheld Transmitter Specifications

- Input power — 2 AA batteries (Alkaline recommended)
- Output power — Meets FCC part 15 requirements for license free operation
- Transmitter dimensions — 6” x 3 1/4” x 1 3/8”
- Transmitter weight — 10 ½ oz.
- Operating temperature range — -40°F to 150°F (-40°C to 65°C)
- FCC ID — QT8PTSS2003

Fixed Transmitter Specifications

- Input power — 12/24 VDC (11VDC to 27 VDC)
- Output power — Meets FCC part 15 requirements for license free operation
- Transmitter dimensions — Joystick: 4 3/4” x 4 11/16” x 10 5/8”
- Operating temperature range — -40°F to 150°F (-40°C to 65°C)
- FCC ID — QT8PTSS2003

RF Receiver/Control Module Specifications

- Power requirements — 12VDC (11VDC to 14VDC)
- RF Receiver/Control Module dimensions — 16 1/4” x 10 1/2” x 3 3/16”
- Control current — 0.15 A*
- Operating temperature range — -40°F to 176°F (-40°C to 80°C)

Table 1

Motor Current Specifications

Monitor	Left/Right	Up/Down	Nozzle
Run I	2 A	2 A	0.5 A
Stall I	12 A	14 A	NA
Current Trip Point	9.2 A	8 A	4 A

Shock:

- 30 G's (55 Hz. @ .2 inch double amplitude)

Vibration:

- 15.5 G's (55 Hz. @ .05 inch double amplitude) continuous operation

Drop Test:

- Both the transmitter and RF receiver/control module must meet operating specifications after drop from 1-meter height onto concrete surface.

Environmental:

- NEMA 4 rating (except 81498001 Joystick Assembly) (must withstand a 1 inch stream of water (65 gpm) from a distance of ten feet for five minutes, with no water entering the enclosure).

* All current ratings are at 12 volts

IV. INSTALLATION INSTRUCTIONS

A. Component Mounting

1. *Sidewinder*™ RF Monitor

Before mounting the *Sidewinder*™ RF monitor, ensure that both the horizontal and vertical rotation envelopes are clear of all obstructions. See Figure 8 and Figure 9 for envelope dimensions. The left-right rotation limits are programmable. [They are factory set at 180° (+/- 90° from zero position)].

Caution: Using the manual override feature will alter the programmed travel limits when used when the left-right motor is not powered. This could cause possible damage to the vehicle or monitor unit.

1) Ensure the left-right and up-down motors are aligned as shown in Figure 8. This is zero position.

2) Ensure that all of the electrical connections have been disconnected.

3) Tighten the Sidewinder® RF monitor to a securely mounted 2.0" NPT (additional support may be necessary). The monitor can be mounted in any orientation, although some orientations will reverse the directions of movement relative to the function labeling on the transmitter(s). Apply a suitable thread sealant, thread the monitor onto the pipe connection, and tighten it securely with a strap wrench. Do not use motors or discharge as a lever to tighten monitor. Make sure the motor on the monitor base is facing away from the intended center of rotation. Harness will not allow monitor to rotate more than 180° from zero position for a total 360° rotation.

4) Reconnect the electrical connections according to Figure 12. Check all of the electrical connections to make sure they are tight. Allow enough slack in the monitor harness to permit travel to the limits allowed by the RF Receiver/Control Module without straining the wires.

Warning: The harness is not designed for continuous 360° rotation. The monitor will travel more than 360° if travel limits are not programmed. Be sure travel limits are programmed to prevent damage from over traveling.

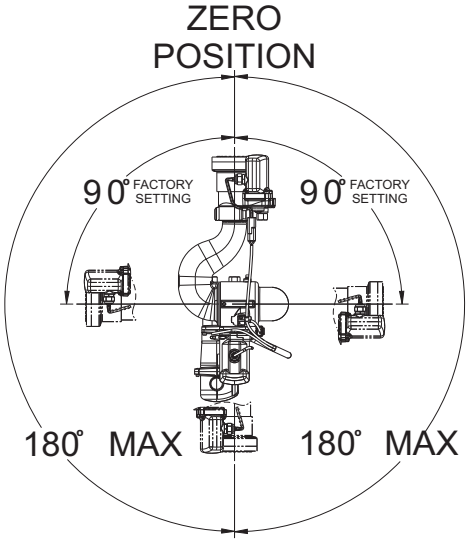


Figure 8
Programmable Left-Right Rotation Envelope

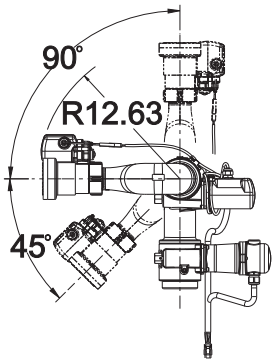


Figure 9
Up-Down Rotation Envelope

2. RF Receiver/Control Module Wiring

1) Place a 10A fuse between the red lead of the RF Receiver/Control Module power connector and a switched positive power lead on the vehicle. Attach the black lead from the RF Receiver/Control Module power connector to the vehicle ground.

2) All control functions are sent to the monitor via an encoded RF signal from the transmitter; no control wiring is needed.

3) Mark the mounting screw pattern per dimensions in Figure 10.

4) Drill four ∅0.203" (13/64" drill) holes.

5) Secure the unit to the panel with four #10-32 screws with nuts and lock washers (not supplied). The length of the screws should be the panel thickness plus 3/8" minimum.

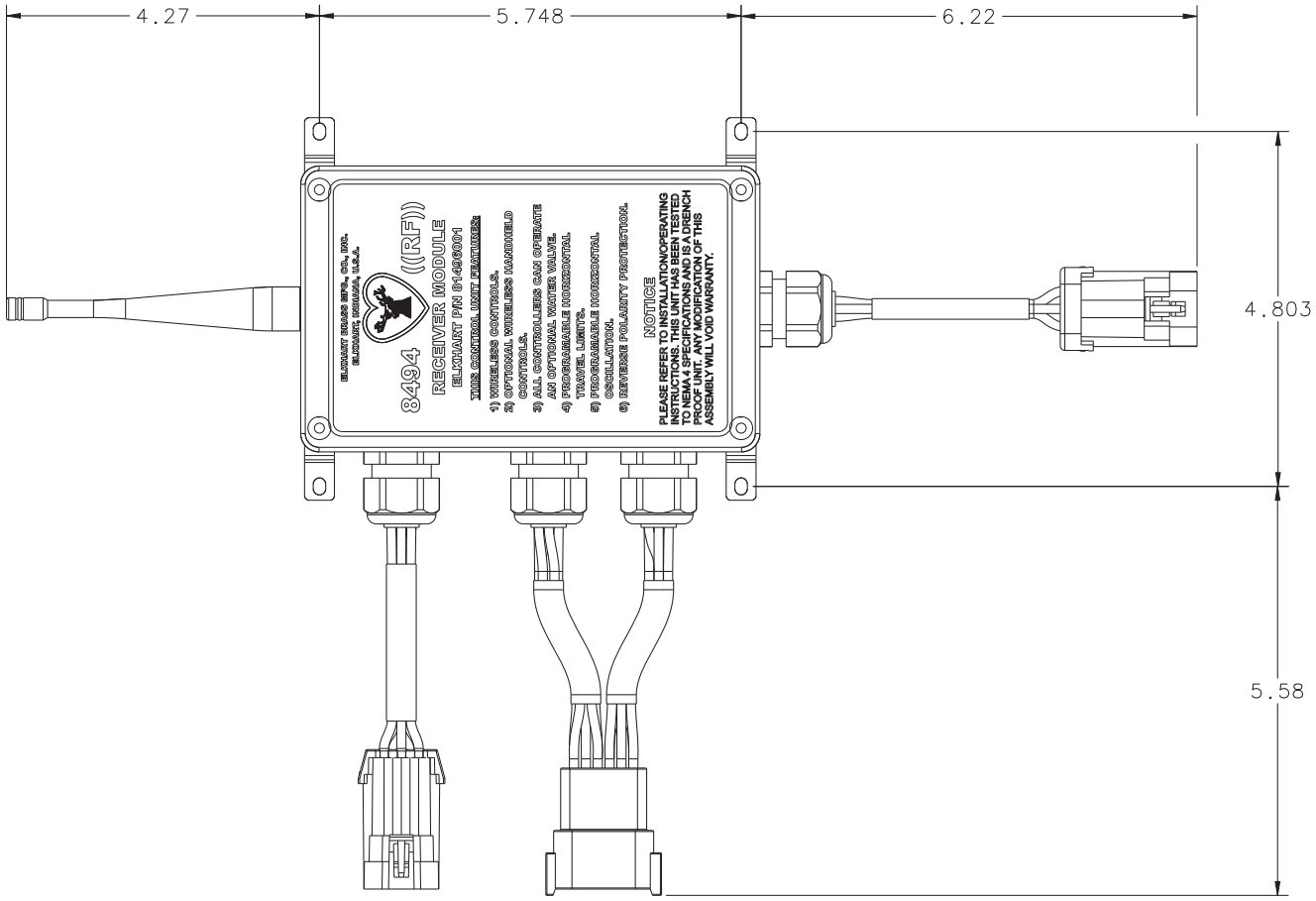


Figure 10

81496001 RF Receiver/Control Module Mounting Layout

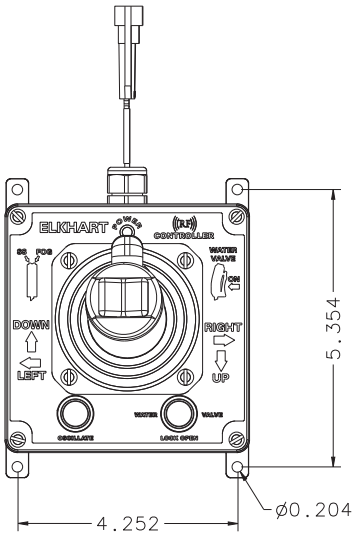


Figure 11
81498001 Joystick Transmitter Mounting Layout

3. Joystick Control Box

1) Mark the mounting screw pattern per dimensions in Figure 11.

2) Drill four ∅0.203" (13/64" drill) holes.

3) Secure the unit to the panel with four #10-32 screws with nuts and lock washers (not supplied). The length of the screws should be the panel thickness plus 3/8" minimum.

4) Place a 1A fuse between the red lead of the transmitter and a switched positive power lead on the vehicle. Attach the black lead from the monitor base to the vehicle ground.

5) All control functions are sent to the monitor via an encoded RF signal from the transmitter.

4. 81181501 Water Valve Kit (Optional)

Install the valve inline with the *Sidewinder*™ RF monitor. Install power/sensor cable between RF Receiver/Control Module and valve. The cables should be routed away from any heat sources, and be protected from sharp corners. It should be tied down securely to prevent fretting or fraying due to vehicular vibrations. Two cable lengths (five foot [standard] and 10 feet [optional]) are available for the valve to allow it to be mounted in a convenient location. Connect the motor power and sensor lead to the valve harness.

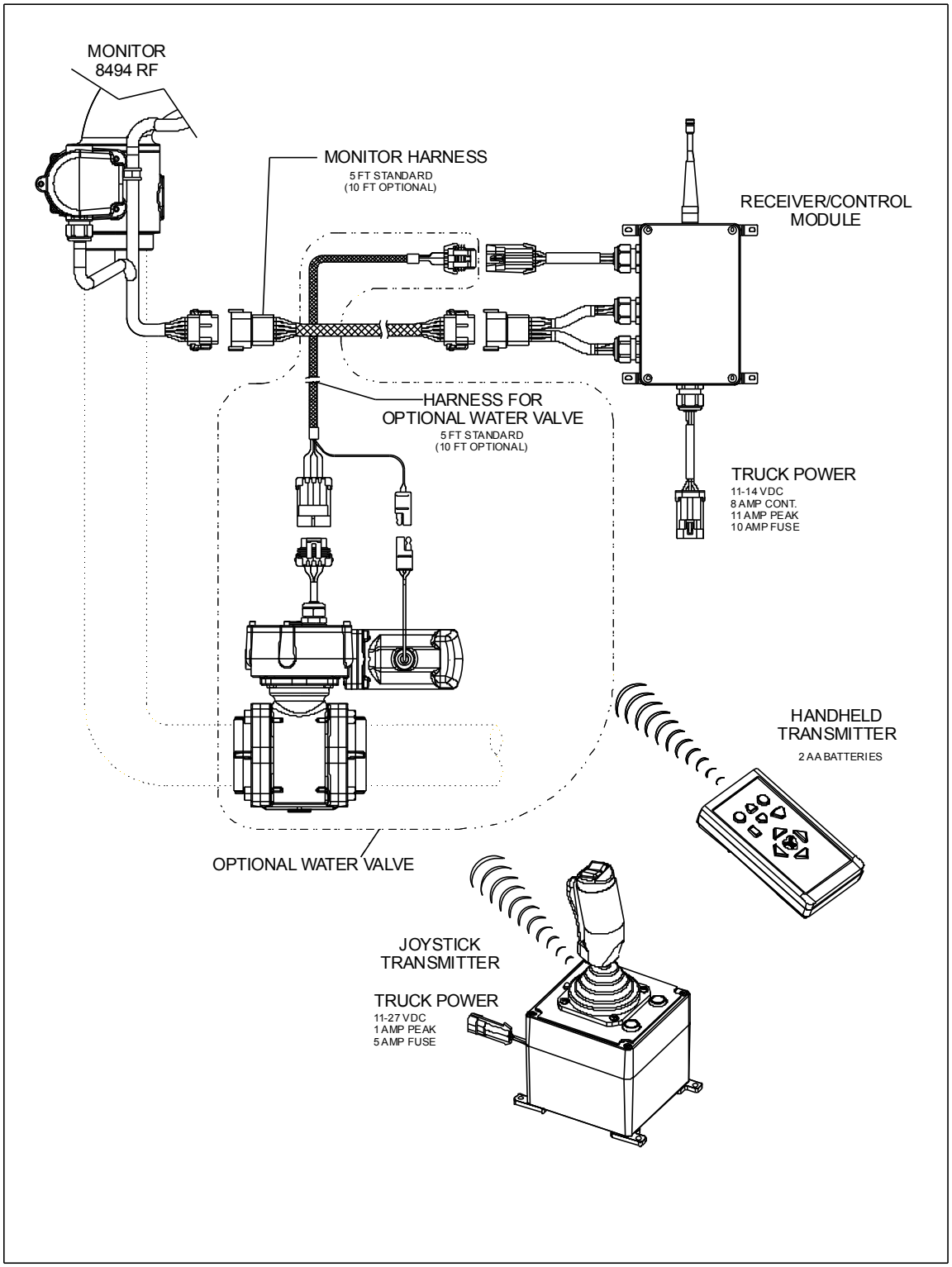


Figure 12

8494 RF 12VDC Layout

B. RF Settings

Caution: The RF Receiver/Control Module and all transmitters' communication addresses have been set at the factory. They should not require any additional address settings. The left-right rotation envelope has been set at the factory for 360° (+/- 180° from center). If an alternate rotational envelope is desired or if manual override is used without power provided to the left-right motor, see section IV.C Left/Right Rotation Envelope Programming for reprogramming of the left-right rotation envelop.

A RF transmitter controls the 8494 RF monitor. The transmitter uses a security code to ensure that it does not accidentally control the wrong monitor. The RF Receiver/Control Module verifies the security code and then interprets commands. The security code is a 15-bit selectable code that is set on both the transmitter and the RF Receiver/Control Module.

The 8494 RF monitor is tested and shipped with a security code based upon the monitor serial number, ensuring each monitor leaves the factory with a unique code assigned to it. The security settings will normally not need to be changed. In cases where a replacement transmitter, new transmitter, or RF Receiver/Control Module circuit board is needed, Elkhart Brass will require the 8494 RF monitor's serial number. This allows the address to be set at the factory on the new unit.

Danger: DO NOT attempt to set two or more systems with identical addresses. Using two W.E.T. monitors with the same, security code may cause the inadvertent control of the wrong monitor, resulting in possible property damage and injury to personnel. Using the factory specified codes will prevent this problem.

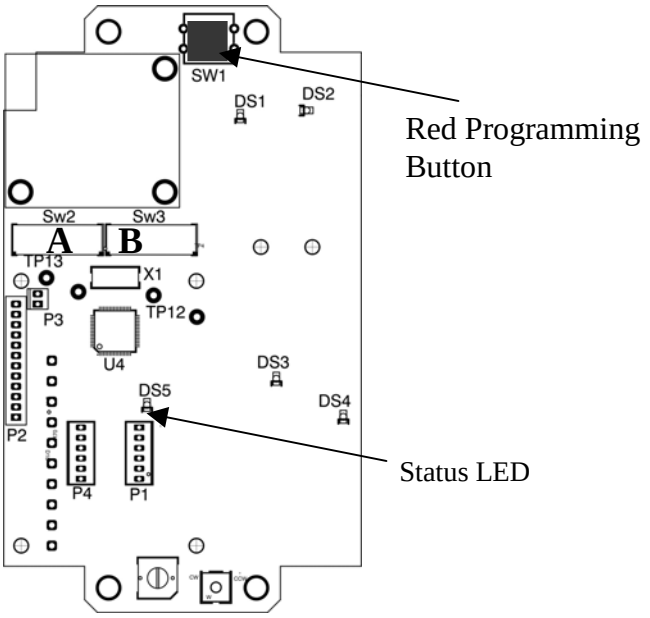


Figure 13
24263001 RF Receiver/Control Module Circuit Board Layout

C. Left/Right Rotation Envelope Programming

The 8494 RF monitor is set with a 180° (+/- 90° from center) left/right rotation envelope. The up/down travel limits are provided by magnets placed in the monitor at assembly and are not adjustable. The range is -45°to 90°.

Caution: To prevent damage to the monitor RF Receiver/Control Module, keep all metallic objects away from the circuit board while it is energized. Ensure all O-ring and gaskets are properly installed when closing receiver or controller enclosures.

1) Open the RF Receiver/Control Module enclosure (P/N 81496001). See Figure 2.
2) Supply power to the RF Receiver/Control Module.
3) To program the left/right rotation envelope, perform the following three steps

NOTE – All three programming steps must be completed otherwise the changes will not be stored to permanent memory!

(1) Press and hold the Red Programming Button (see Figure 13) on the circuit board until the status LED (DS5) flashes 3 times (approximately 8 seconds). Once the LED starts flashing, release the red button.

(2) To set the left limit of the travel envelope, run the monitor left until it has reached the desired position. Quickly press and release the Red Programming Button. The status LED will flash once to acknowledge the new travel limit position.

(3) To set the right limit of the travel envelope, run the monitor right until it has reached the desired position. Quickly press and release the Red Programming Button. The status LED will flash rapidly approximately 8-10 times to acknowledge the new travel limit position as well as the completion of the programming sequence.

(4) Replace the RF Receiver/Control Module cover removed earlier.

Caution: Left/Right rotation travel envelope should be verified to be correct after programming. If the monitor does not stop at the programmed rotational limit positions then re-program the rotational limits. Checking rotational limits should be part of normal truck maintenance.

Caution:
Using the left-right override nut when the power to the receiver module is off or the horizontal motor is disconnected will move the horizontal limits from their original programmed positions.

V. OPERATING INSTRUCTIONS

A. Normal Operation

1. 81498001 Joystick Transmitter

A. Monitor Control

With the 81498001 Joystick Transmitter, the monitor, nozzle, and valve are controlled with the joystick and accompanying switches. Simply push and hold the joystick to move the monitor to the desired stream direction. Release the joystick when the proper stream position is achieved. The nozzle spray pattern is controlled using the rocker switch on the top of the joystick. The controller provides an automatic left-right speed adjustment to allow the user better directional control. During normal operation, the left-right motor will move slowly for about two seconds before accelerating to full speed. This allows the user to be able to position the monitor quickly but also gives the fine control needed to aim the monitor accurately at a distant target. Any combination of left or right and up or down can be used simultaneously.

B. Valve Control

To flow water for short durations operate the valve with the trigger on the front of the joystick. The valve will remain open as long as the trigger is squeezed. When it is released, the valve will close. To continuously flow water, simultaneously push the lock open pushbutton and squeeze the water valve trigger on the joy stick; once the water valve starts moving the operator may release both switches and the valve will travel to the full open position. To close the valve, push and release either the lock open pushbutton or the water valve trigger on the joystick.

2. 81502001 Handheld Transmitter

The 8494 RF Monitor uses the standard Left/Right, Up/Down, and Fog/Stream commands to provide stream direction and pattern adjustments. The transmitter provides an automatic speed adjustment to allow the user better directional control. During normal operation, the left-right motor will move slowly for about two seconds before accelerating to full speed. This allows the user to be able to position the monitor quickly but also gives the fine control needed to aim the monitor accurately at a distant target.

To move the monitor left or right, press and hold the left or right button until the monitor discharge is in the correct position. The left-right motor will begin to turn the monitor slowly and then accelerate to full speed after a couple of seconds. If any of the up-down or fog-stream buttons are selected while the left-right motion is in slow speed, the left-right motor will immediately go to high speed until the monitor stops moving. The unit will revert to normal operation when the buttons are released.

1) To move the monitor up or down, press and hold the up or down button until the monitor is in the correct position or an electrical stop is reached.

2) To adjust the stream pattern, press and hold the fog or stream button until the desired stream pattern is reached. Elkhart electric nozzles have a unique ball screw drive which when it reaches the end of travel will continue spinning until the button is released.

Any combination of left or right and up or down can be used simultaneously. If the left and right buttons are pressed at the same time, the monitor will stop all motion.

3) To open the water valve, push and release the valve open button. The valve will open fully and remain open. To close the valve, push and release the valve close button. The valve will completely close and remain closed. There is no need to wait for the valve to fully open or close before reversing direction. The close button for the water valve on the handheld will disengage the lock open feature of the primary transmitter and close the water valve. This feature allows the operator to exit the vehicle with the water valve locked open and operates the monitor via the handheld. When and if the operate chooses to take over command of the water valve, a push of the close button releases the "lock open" feature and transfers water valve control to the handheld.

4) The handheld transmitter has a power saving feature that turns the transmitter power off if no signal is sent for 5 minutes. Press and hold the "ON/OFF" button until the Power LED illuminates to reactivate the transmitter. The "Low Battery" LED will flash slowly when the battery voltage drops below a predetermined level. When the low battery LED flashes rapidly, the batteries are nearly discharged and should be replaced immediately.

B. Oscillation Function

The 8494 RF monitor has an oscillation function, which can be used to provide continuous exposure protection with no operator input. The oscillation limits are set using either joystick or handheld transmitters. The motor two-speed feature is turned off during oscillation and the monitor will oscillate back and forth at full speed.

Note: The oscillation travel limits must be within the programmed left/right rotation envelope.

1) Position the monitor at one of the oscillation travel limits.

2) Press and hold the oscillate button.

3) Move the monitor to the other oscillation travel limit and release the direction button

4) Release the oscillate button.

5) Quickly press and release the oscillate button to start the oscillation function.

6) The monitor will oscillate between the programmed limits until the oscillation button is pressed again or initiating a left or right command from any transmitter.

7) Changing up-down position stream setting or operating the water valve will not interrupt the oscillation program.

For safety reasons, once oscillation has stopped the oscillation travel limits need to be reprogrammed. See steps 1-7.

C. Manual Override

In the event of power failure, the monitor, nozzle, and water valve may be actuated manually. To operate a function manually, simply apply a 3/4" ratcheting type wrench (either socket type or ratcheting box end type) to the hex fitting on the motor shaft extension. The override functions can be made much easier if the motor power wire connector is unplugged from the control harness where possible.

Caution:

Do not use any power tools to operate the manual override nuts. Serious damage to the motor gear heads will result. Using the left/right override nut when the power to the control module is off or the left/right motor is disconnected will move the left-right rotation envelope limits from their original programmed position, which may result in damage to the vehicle and/or monitor. The left/right rotation envelope should be reprogrammed after power has been restored.

VI. MAINTENANCE

A. Preventive Maintenance

The complete monitor and control system should be inspected during each apparatus check. Careful inspection for damage to the monitor, valve, or nozzle is especially important after use of the *Sidewinder*™ RF Monitor in emergency operations.

1. Operate all possible functions from each control point.

2. Flow water to check the nozzle pattern. If the pattern is disrupted, clear the debris. The 5000-04 nozzle has a flush feature to clear the debris. If the obstruction still remains, remove the nozzle and check for debris lodged between the nozzle stem and body.

3. During nozzle flow test, inspect monitor swivel joints and water valve for leaks.

4. Inspect all exposed wiring for signs of damage.

Note: Although grease fittings are provided for the up-down and left-right gear cases, routine greasing should not be necessary. If the monitor is exposed to high level of radiant heat for a prolonged period, it may be possible for the factory grease to thin and run out of the gear cases. In such an event, fresh grease should be applied. It is recommended that Mobilith AW2 grease be used to lubricate the monitor gearing.

B. Understanding the RF Receiver/Control Module Circuit Board LEDs

LED Notations
DS1 (Figure 13) - Lights when either nozzle direction is engaged.
DS2 (Figure 13) – Lights when either of the VALVE OPEN/CLOSED buttons are pushed.
DS3 (Figure 13) – Comes on when the UP or the DOWN button is depressed.
DS4 (Figure 13) – Comes on with any horizontal movement.
DS5 (Figure 13) – See Table 2.

Table 2

DS5 Status LED (Indication VS. Meaning)

Reference	Indication	Meaning
1	On solid when monitor stops	Motor has reached stall current and performing normal shutdown
2	Blinks 6 times at 1 second rate during startup	Visual indication that the controller is initializing – normal operation during power up
3	Blinks 6 times at 1 second rate during startup then blinks at ¼ second rate continuously	SW4 (Figure 13) in wrong position – must be in certain positions for proper Sidewinder operation
4	Blinks at ½ second rate	Truck battery voltage <8 volts - light will blink until power is lost or is restored – early power fail (EPF) indication

C. Handheld Transmitter

1. Battery Type

The 8494 RF handheld transmitter uses two AA batteries. Alkaline batteries are recommended. The low battery light will illuminate with approximately two hours of transmission time remaining before the batteries are completely discharged. Due to the time-voltage characteristics of rechargeable batteries, this time could be drastically reduced if rechargeable batteries are used.

2. Replacing the Batteries

The batteries can be replaced with any standard fresh AA alkaline batteries.

1) Turn the transmitter power off.
2) Remove the battery cover.
3) Remove both of the old AA batteries at the same time.
4) Insert the new AA alkaline batteries.
5) Replace the battery cover.

VII. MONITOR & NOZZLE HYDRAULIC DATA

5000-04 Flow Data (GPM)				
PSI	15 GPM Stem	30 GPM Stem	45 GPM Stem	
40	9	20	32	
50	11	22	35	
75	12	26	40	
100	15	30	45	
125	17	34	49	
150	18	37	52	
175	20	39	56	
200	22	41	58	

5000-04 Reach Data (ft)												
	15 GPM Stem			30 GPM Stem			45 GPM Stem					
	SS	N. FOG	W. FOG	SS	N. FOG	W. FOG	SS	N. FOG	W. FOG			
40												
50	48	20	11	65	30	15	69	32	17			
75	56	22	14	70	35	16	75	37	18			
100	58	24	15	81	41	17	83	44	21			
125	61	26	17	85	44	21	91	46	23			
150	63	28	19	90	47	23	96	48	25			
175	65	31	21	91	48	25	98	50	26			
200	66	32	22	92	49	26	101	51	28			

5000-14 Flow Data (GPM)				
	60 GPM Stem	95 GPM Stem	125 GPM Stem	150 GPM Stem
40	38	63	82	97
50	43	68	91	107
75	51	83	110	132
100	60	95	125	150
125	68	107	140	169
150	73	115	153	182
175	79	126	165	198
200	85	134	177	212

5000-14 Reach Data (ft)												
	60 GPM Stem			95 GPM Stem			125 GPM Stem			150 GPM Stem		
	SS	N. FOG	W. FOG	SS	N. FOG	W. FOG	SS	N. FOG	W. FOG	SS	N. FOG	W. FOG
40	69	38	31	77	40	29	78	44	32	80	46	34
50	76	41	33	86	41	30	86	48	36	89	51	37
75	89	44	35	101	46	33	103	55	37	108	53	43
100	96	49	41	111	55	36	113	62	44	124	56	46
125	104	55	43	118	59	40	121	67	49	138	58	48
150	110	61	47	126	64	44	128	71	52	148	60	51
175	115	66	51	130	67	47	138	77	56	156	62	52
200	124	71	58	138	70	51	146	84	59	162	64	55

Figure 14

5000-04 and 5000-14 Flow and Reach Data

5000-24 Flow Data (GPM)				
	175 GPM Stem	200 GPM Stem	250 GPM Stem	350 GPM Stem
40	111	126	172	220
50	124	141	192	240
75	150	173	230	289
100	175	200	250	325
125	192	224	279	362
150	210	245	306	398
175	231	265	331	429
200	247	283	353	459

5000-24 Reach Data (ft)												
	175 GPM Stem			200 GPM Stem			250 GPM Stem			350 GPM Stem		
	SS	N. FOG	W. FOG	SS	N. FOG	W. FOG	SS	N. FOG	W. FOG	SS	N. FOG	W. FOG
40	88	47	32	91	51	34	91	53	35	97	57	39
50	98	51	34	101	54	36	102	56	40	108	61	43
75	114	59	36	117	61	40	118	62	43	126	67	47
100	126	69	39	132	73	44	136	75	48	142	70	52
125	141	76	44	148	78	48	152	79	51	160	86	55
150	152	81	48	159	83	52	164	83	54	173	89	59
175	165	88	51	-	-	-	179	89	58	188	95	63
200	178	95	54	-	-	-	193	95	62	203	102	67

Figure 15
5000-24 Flow and Reach Data

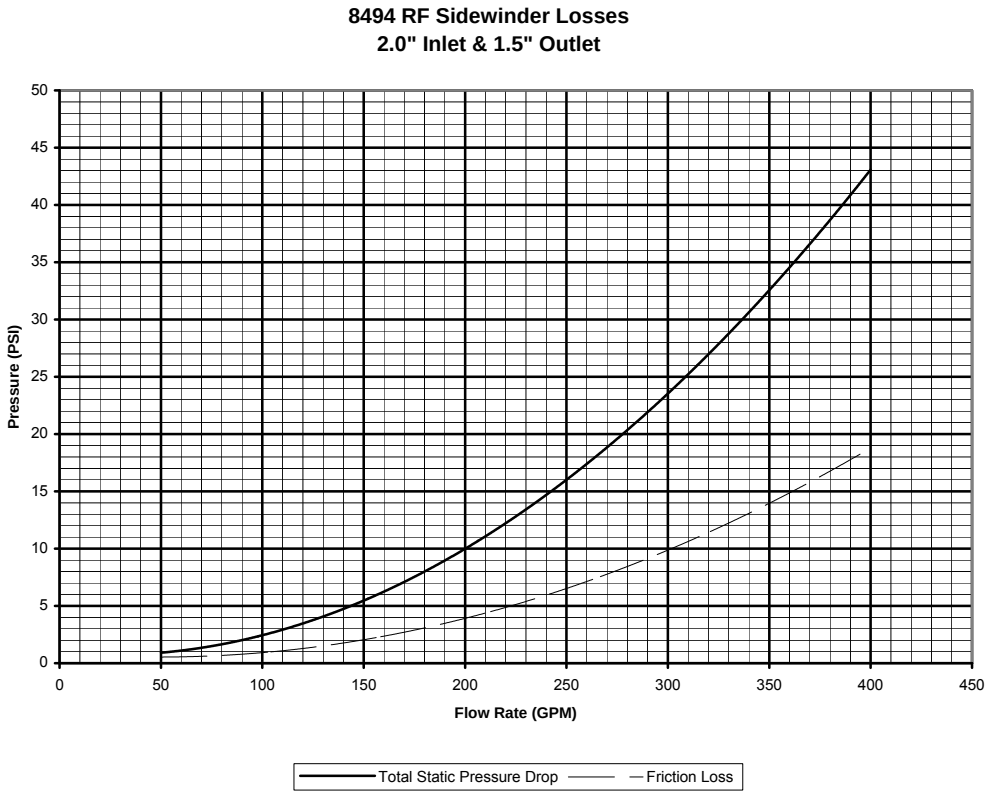
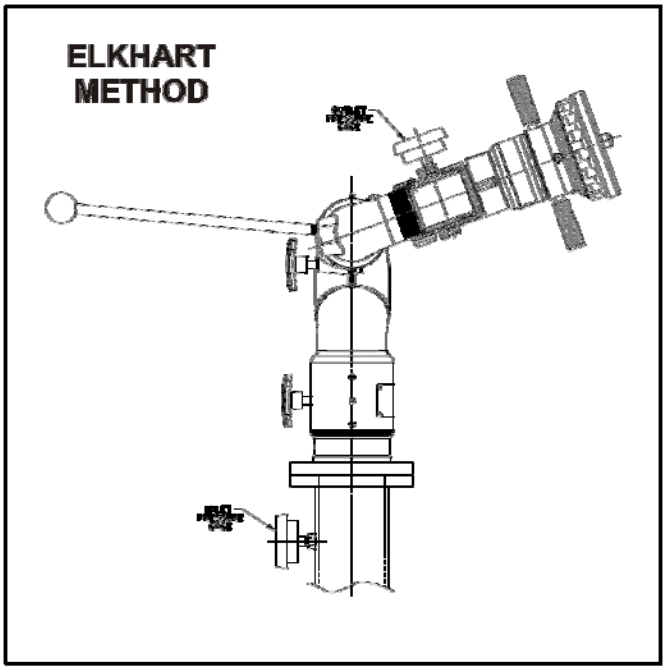


Figure 16
8494 RF Sidewinder™ RF Monitor Losses

Interpreting Flow Data

The following graphs offer the pressure losses for the monitor (and other devices) in terms of Total Static Pressure Drop. This Total Static Pressure Drop can be found by measuring the difference between the static inlet pressure and the static outlet pressure. The static pressure at either of these points can be found using a simple pressure gauge. An illustration of this method can be seen below.



In mathematical terms, the Total Static Pressure Drop is the change in Velocity Pressure plus Friction Loss. The change in Velocity Pressure results from the change in velocity of water caused by the change in the cross section of a waterway. Friction Loss results from the drag and sidewall interference of the water through a device. A simple equation can be seen below.

$$\Delta P_S = H_F + \Delta P_V$$

ΔP_S = Total Static Pressure Drop
H_F = Friction Loss
ΔP_V = Velocity Pressure Loss

In the firefighting industry, the terms Total Static Pressure Drop and Friction Loss tend to be used interchangeably. However, these are significantly different measurements. This misconception could ultimately lead to lower than anticipated performance from equipment. **When designing a system and determining performance, Total Static Pressure Drop is the value that should always be used.** The Friction Loss curve is also supplied in order to make a comparison with competitor products that may only supply Friction Loss curves. If there are any further questions regarding this matter, please contact Elkhart Brass.

VIII. PARTS DRAWINGS

Please visit our website at www.elkhartbrass.com for the most current parts drawing.

Elkhart Brass

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